UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/085,725	02/28/2002	Toshihito Tsuga	TI-31621	1672

23494 7590 08/27/2004

TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER	
KORNAKOV, MICHAIL	
ART UNIT	PAPER NUMBER
1746	

DATE MAILED: 08/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/085,725	TSUGA ET AL.	
	Examiner	Art Unit	
	Michael Kornakov	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. In the amendment, dated 06/21/2004, Applicants cancelled claim 7, amended claim 1, exemplifying "A **batch cleaning** method for removing particles on **a plurality of** semiconductors wafers" and amended claim 6, exemplifying "solution, **comprising** an HF".

2. The objections to the specification and claim 6 are withdrawn in view of Applicants' remarks.

3. The provisional double patenting rejection of the instant claims 1,2,3,5 and 6 over claims 1,3 and 7 of copending Application No. 10/085753 is maintained.

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1,2,3,5,6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuno et al (US 2001/0009155) in view of Imaoka et al (U.S. 6,290,777) or, separately, in view of Jolley (U.S. 6,394,106).

Matsuno teaches a semiconductor wafer cleaning method, including the steps of treating the wafer with hydrogen water, which has been prepared by dissolving a hydrogen containing gas in ultra-pure water (reads on the "first cleaning process", as instantly claimed), wherein the treatment with hydrogen water is enhanced by applying ultrasonic waves in a conventional manner; treating the wafer with ozone water, which has been prepared by dissolving ozone containing gas in ultra-pure water (reads on the "second cleaning process", as instantly claimed) and performed before the first cleaning process (page 12, claim 1; page 4, paragraph 0046); treating the substrate with HF-

containing water (reads on the "third cleaning process", as instantly recited), performed after the second cleaning process (paragraph 0055; claim 20). With specific regard to claim 3, Matsuno teaches that hydrogen water for use in the present invention can be obtained by bringing a hydrogen-containing gas, which has been produced by a known hydrogen generator, into contact with ultrapure water. The concentration of hydrogen in the hydrogen water may preferably **be 0.5 ppm** or higher [0042], thus anticipating the instantly claimed range.

Regarding the limitation of claim 1, which is concerned with prescribed gas concentration in a range 20% to 50% of the saturation concentration, this limitation is met by Matsuno taking into consideration the Applicants' admission that solution concentration of hydrogen gas in the range 0.3 ppm to 0.8 ppm corresponds to 20% to 50% of the saturated concentration of hydrogen gas (page 8, paragraph 0020). Because Matsuno anticipates the concentration of hydrogen in the cleaning solution, the recited "range 20% to 50% of the saturated concentration" of a prescribed gas, which is hydrogen, is also anticipated by Matsuno.

Matsuno specifically indicates that his cleaning method can be realized utilizing soaking technique (page 10, paragraph 0087) and therefore immersing the wafer in respective cleaning solutions is within the scope of Matsuno's teaching.

The teaching of Matsuno differs from the instant claims by not reciting a "**batch cleaning** method" for cleaning "a **plurality** of semiconductor wafers". However, Matsuto teaches the use of wafer soaking treatment, which is also widely utilized in batch processing of a plurality of semiconductor wafers, as indicated by the general teaching

of Imaoka (col.2, lines 31-37). Therefore, one skilled in the art, motivated by the teaching of Matsuno would have found obvious to utilize a batch type cleaning of a plurality of wafers in lieu a single wafer treatment, utilizing the soaking treatment of Matsuno in order to increase the processing output and decrease the production cost in the method of Matsuno with the reasonable expectation of success.

Furthermore, it is also noticed here that the prior art recognizes equivalency between a batch processing mode and a single wafer processing, as indicated by Jolley (col.2, lines 24-31). However, the substitution of equivalent methods requires no express motivation, as long as the prior art recognizes equivalency, consult ***In Re In re Fount*** 213 USPQ 532 (CCPA 1982); ***In Re Siebentritt*** 152 USPQ 618 (CCPA 1967); ***Graver Tank & Mfg. Co. Inc. V. Linde Air products Co***. 85 USPQ 328 (USSC 1950).

6. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuno et al (US 2001/0009155) in view of Imaoka et al (U.S. 6,290,777) or, separately, in view of Jolley (U.S. 6,394,106) and in further view of Yeol et al (U.S. 6,039,815)

Matsuno/Imaoka or Matsuno/Jolley do not specifically indicate the presence of ammonia in the first cleaning solution comprising water and hydrogen. However, the use of ammonia in semiconductor cleaning solutions is a routine procedure in the art. In fact, commercial cleaning solutions, such as SC-1, contain ammonia. Yeol disclose a method for cleaning a semiconductor substrate using hydrogen water (wherein hydrogen is dissolved in ultra pure water) and/or ozone water (see abstract), specifically describing the embodiment wherein the object is washed with an aqueous reducing alkaline solution prepared by mixing hydrogen water and alkaline solution (col.2, lines

64-67). In example 3 in col.10 Yeol provides for an aqueous reducing alkaline cleaning solution used for washing. The aqueous cleaning solution was prepared by mixing 2 mmol/l ammonia water and a hydrogen water having a concentration of 1 to 2 PPM. Yeol further provides the motivation for combining a hydrogen water and ammonia, showing the superior cleaning result while cleaning the substrate with such combination.

Therefore, those skilled in the art at the time the invention was made would have found obvious to add the ammonia solution to a hydrogen water of Matsuno/Imaoka or Matsuno/Jolley, as done by Yeol, in order to enhance the cleaning ability of hydrogen water solution of Matsuno, and thus to arrive at the instant claim 4.

Response to Arguments

7. Applicant's arguments filed 06/21/2004 have been fully considered but they are not persuasive. Applicants argue that amended claim 1 is unanticipated by Matsuno as there is no disclosure or suggestion in the Matsuno of a batch cleaning method.

With all due respect, Applicants' attention id drawn to the fact that a reference anticipates the claim if it discloses the claimed invention such that a skilled artisan could take its teachings in combination with his own knowledge of the particular art and be in the possession of the invention, In re Graves, 36 USPQ 2d 1797, (Fed. Cir. 1995). The related particular art is recited above and the reasoning of combining such art with the reference to Matsuno is provided in paragraphs 5 and 6 of this Office Action.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M. Kornakov

Michael Kornakov
Primary Examiner
Art Unit 1746

08/25/2004